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SECOND ANNUAL REPORT OF THE TEHUACAN ARCHAEOLOGICAL-BOTANICAL PROJECT

BY

RICHARD STOCKTON MACNEISH

A project supported by grants in aid from:
THE NATIONAL SCIENCE FOUNDATION
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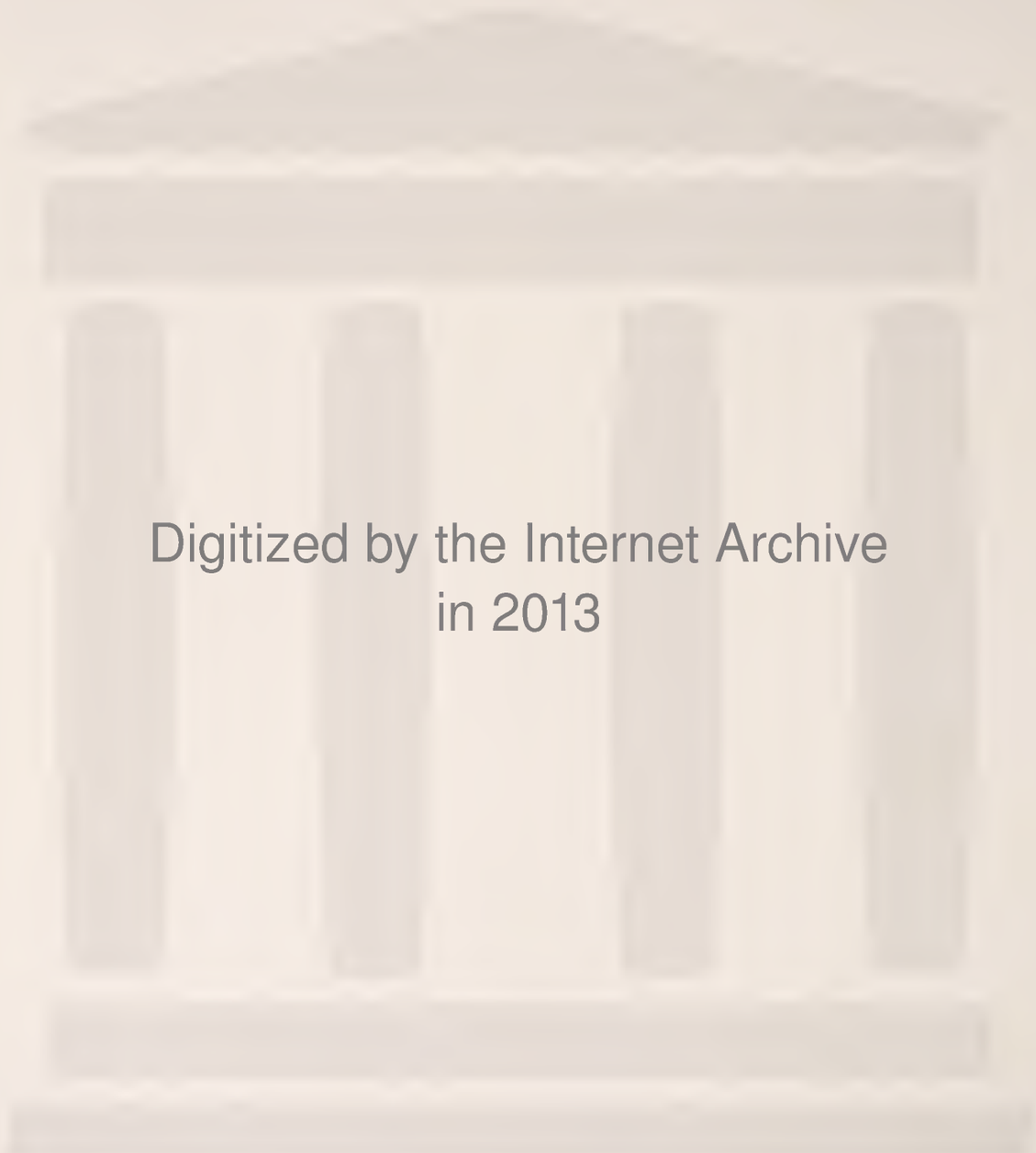
NUMBER TWO



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Tehuacan Valley. Coxcatlan Cave. The archaeological deposits extended from the right-hand end of the shelter nearly to the left margin of the picture. The man stands on sifted dirt from the excavation.

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SECOND ANNUAL REPORT

The purposes and archaeological problems of the second season of the Tehuacan Archaeological-Botanical Project were much the same as those defined in our First Annual Report. In rough outline these were:

(1) How, where and when did corn agriculture begin in the New World?
(2) What were the cultural changes from savagery to civilization that accompanied this development in the basic subsistence pattern?
(3) What bearing does the above have on the problems of how and why civilization arose anywhere?

Previous research, as well as results of the 1961 excavations, indicated the probability that the problem of the domestication of maize might be solved by further investigations in the Tehuacan region. Preliminary soundings and survey in southern Puebla in 1960-1961 hinted that future, more extensive, excavation might yield a complete sequence of culture from primitive hunters to sophisticated urban dwellers. The basic task of the second season was to collect enough information to give us more definitive answers to these problems. Needless to say, with little analysis completed and with our expedition working full time collecting data, little thought has been given to the larger more general problems of how and why civilization arose.

Any success we achieved this season was due, in no small part, to the fine local and official cooperation we received. On the local level we would like to thank the Mayor of Tehuacan, Dr. Juan Fernandez Contreros who not only helped us in many ways but officially honored Fowler, Peterson and me with a diploma stating that each was "Huesped Distinguido y Amigo Predilecto de Tehuacan"; Sr. Jaime Zurita, Manager of the Tehuacan office of the Banco de Comercio de Puebla, who aided us in financial matters; Srs. Herrera and Gutierrez of the Hotel Peñafiel, who most graciously looked after our various guests and visiting specialists; Sr. Elpidio Medrano, our mechanic who always somehow got our rolling stock ready for work by Monday morning; Sr. Isauro Linares, who taxied our guests and specialists here and there; as well as many others, who so willingly offered their services. Of special merit in this latter group were the sixty or more laborers in the field, who not only did excellent archaeological work but who regularly performed tasks above and beyond the call of duty.

On the official level I would like to thank my friend and colleague, Sr. Jose Luis Lorenzo, Chief of the Departamento de Prehistoria of the Instituto de Antropologia e Historia of Mexico. Not only did he guide us through all the necessary governmental channels, but he helped the expedition in many other ways. Also, I would like to thank Dr. Eusebio

Davalos, the Director of the Instituto, for his official sanction as well as for the warm, friendly interest he showed in our endeavors. In no small part, their interest and favorable comments about our investigations were responsible for visits by other members, or former members, of the Instituto. Among these were Drs. Alfonso Caso, R. J. Weitlaner, Ignacio Bernal, Carlos R. Margain, Joaquin Cortina and Luis Aveleyra. All must be thanked for both their advice and interest.

Akin to these stimulating visits by the members of the Instituto were brief stays by many other professional biologists and archaeologists. These include Dr. Alex Krieger, University of Washington; Dr. J. Alden Mason, former Director of the University of Pennsylvania Museum; Dr. Michael Coe, Professor of Anthropology at Yale University; Mr. Kent Flannery, graduate student at the University of Chicago; Mr. Donald Brockington of the University of Wisconsin; Dr. Carmen Cook de Leonard of the Centro de Investigaciones Antropologicas of Mexico; Messrs. Gareth Lowe, Bruce W. Warren, Jose Martinez, Miss Willoughby Agrinier and Dr. Christian of the New World Archaeological Foundation; Dr. Guy Stresser-Pean of the expedition of the Musee de l'Homme; Drs. W. H. Hatheway and E. J. Wellhausen of the Rockefeller Foundation; Miss Cynthia Irwin, a student at Harvard University; Prof. Juan Armenta of the Museo de Antropologia e Historia, in Puebla; Dr. John Paddock of Mexico City College; Dr. Robert F. Heizer, Chairman of the Department of Anthropology, University of California; and Dr. M. Wohlrath of the American Museum of Natural History. We would also like to thank them for their interest and assistance.

On a more materialistic level, we would like to express our gratitude to the National Science Foundation and to the Rockefeller Foundation for their generous support of our expedition. In particular we would like to thank Dr. Albert C. Spaulding of the National Science Foundation and Dr. E. J. Wellhausen of the Rockefeller Foundation who were responsible for our receipt of funds under grants-in-aid in a manner most convenient to us.

The actual handling of the funds, accounting, keeping of records, and other general administration was accomplished for the expedition by our hard-working Assistant Director, Mr. Fredrick A. Peterson, with very able assistance from Mr. Douglas S. Byers and his staff in the home office at Andover.

Except for a Landrover station wagon, a wide carriage typewriter, some replacements for digging tools, office supplies and materials for visiting consultants, the expedition acquired few new items of equipment. Of course, we continued to borrow generously from the equipment storeroom of Jose Luis Lorenzo of the Departamento de Prehistoria. Our headquarters was approximately the same as in the previous year except that we were able to rent an additional room (twelve by five meters) to be an archaeological laboratory. This was furnished with shelves, drawers, large tables, etc. The management of our house-

hold continued to be under the able direction of Mrs. Peterson who was willingly assisted by Lupe.

Other expedition personnel I shall mention in relation to their activities during our field season. Last summer Dr. C. E. Smith, then of the Chicago Natural History Museum and now of the U. S. Department of Agriculture, undertook a botanical survey of the Tehuacan region as well as a study of modern land uses. During his survey he usually traveled with Peterson who continued his search for new sites. Smith terminated his "wet season" collecting of plants late in August; Peterson continued survey until December. In December, after I had arrived with the new Landrover station wagon, Peterson showed me other promising cave sites he had found in the previous months. At the same time we also looked for a few more caves.

Miss Antoinette Nelken arrived about the middle of the month to organize her new laboratory. She prepared to study some of the excavated materials that Narciso Tejeda and Francisco Molina had completely catalogued during the summer and fall months. Sr. Angel Garcia C. assisted with cave testing during the last week of the month. Peterson got in a little more survey, though most of his time was consumed in organizing living arrangements, administration, and getting the expedition ready for the "big push".

In January, Miss Nelken and I started a preliminary classification of the chipped stone artifacts found in the previous season's excavations. Narciso took charge of cataloguing. By the end of the month we had tentatively classified the projectile points and the bifaces. Peterson was then able to get back to his survey and it moved along rapidly with an average of about two new sites a day. My main activity was testing a series of likely sites, mainly caves, with a crew of six workers of our last year's "El Riego crew". The testing of sites--or as Peterson said, this "blitzing of sites"--usually consisted of putting a trench one meter wide and from three to five meters long and as deep as the refuse extended, across what appeared to be the best stratigraphic part of the archaeological unit. Six caves were tested in Tecorral Canyon, three were tested at El Riego, one at San Andres, four near Purron Canyon, one near Coxcatlan Cave, and two stratitests were sunk in Ajalpan. By the end of the month, we knew what we had to excavate this season and where we were going to do it.

Near the end of January, Garcia rejoined me and we started digging in Tecorral Canyon. Here we excavated two caves, Tc254 and Tc255, which were finished by mid-February. Then, for the rest of the month, we moved on to begin digging Purron Cave, Tc272. Peterson continued survey, Narciso the cataloguing, and Nelken the classification of excavated uniface artifacts.

In mid-February, Mr. Frederick Johnson of the R. S. Peabody Foundation for Archaeology joined the expedition to collect carbon and to teach the archaeologists how carbon should be collected and treated

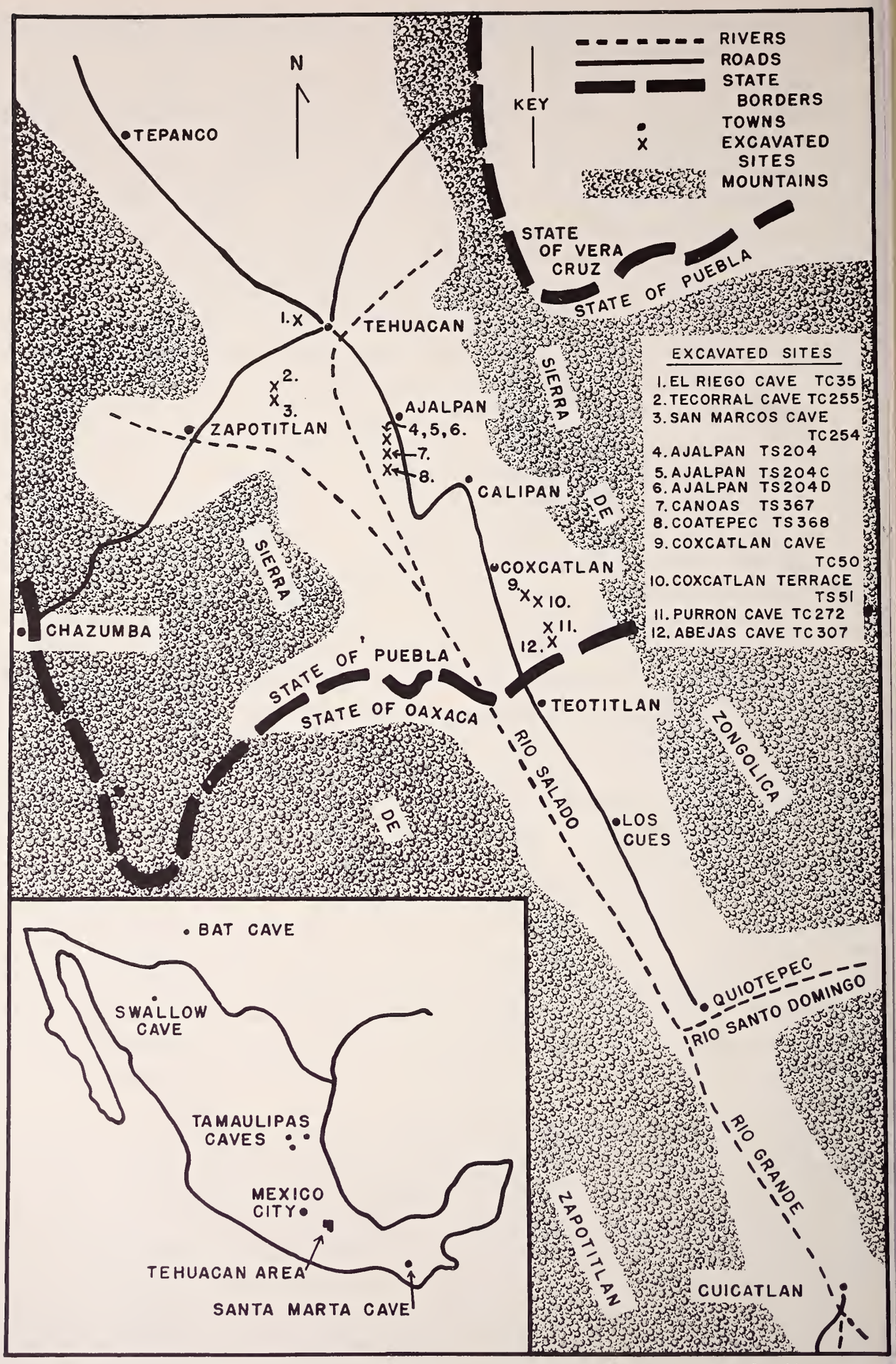


Fig. 1. The Tehuacan Valley. X's show locations of sites.

so it could be used for radioactive carbon-14 analysis. He also organized a system for recording radiocarbon dating of our archaeological remains. During the latter part of the month, Dr. Melvin Fowler, Curator of North American Archaeology of the Museum, University of Southern Illinois, joined the expedition to re-open the excavations of Coxcatlan Cave, Tc50, which he directed until Easter week when he returned to Illinois. Dr. Thomas W. Whitaker, Senior Research Geneticist, U. S. Department of Agriculture and Dr. Hugh Cutler, Executive Director, Missouri Botanical Gardens arrived in Tehuacan during the last days of February to begin their studies of our archaeological cucurbits.

In March, Johnson, Whitaker, and Cutler finished their specialized studies and Peterson stopped surveying to begin excavating. Garcia also completed the initial excavation of Purron Cave and returned to school in Mexico City. Fowler continued his productive excavation in the stratified Coxcatlan Cave; for a time Nelken acted as his assistant. Later in the month, Mr. Robert Chadwick, a student at Mexico City College, joined the field party and took Nelken's place as Fowler's assistant. Between helping the specialists, acting as field assistant, and guiding visitors, Nelken somehow found time to set up some tentative types of ground stone tools and to direct Narciso in cataloguing. About mid-March Peterson and I began the excavation of a deep stratified section of the Formative site near Ajalpan, Ts204. Here we were ably assisted by Mr. Douglas S. Byers, Director of the R. S. Peabody Foundation for Archaeology as well as by his wife. Let me hasten to add that Mrs. Byers dug most of an important bell-shaped burial pit, Ts204C. Perhaps even more important than the assistance Byers gave us at the excavations was his advice concerning the planning of our research program as well as his discussion of our future publication plans. Near the end of the month, Sr. Arturo Arvide, a student of archaeology with the Instituto, became Fowler's second assistant at the Coxcatlan Cave excavation.

In the previous months our program had ground along slowly but steadily but in April it shifted into high gear--or perhaps I should say overdrive. Peterson and I continued at Ajalpan and as our workmen became better trained we slowly increased the size of the crew. Fowler, with the help of Chadwick and Arvide, dug extensively in Coxcatlan Cave, Tc50, as well as in the open site in front of the cave, Ts51. Later in the month, Arvide and I began the excavation of a new cave--Cueva Abejas, Tc307--and I dug a little in Purron Cave in preparation for Garcia's return. By renting a local truck we could increase the size of the crews at Purron, Abejas, and Coxcatlan Caves. Narciso continued cataloguing while Nelken and I began a preliminary analysis of material from San Marcos Cave, Tc254.

During Easter week, Dr. Eric O. Callen of the Department of Botany, MacDonald College, Ste. Anne de Bellevue, Quebec, Canada

arrived to begin analysis of archaeological feces.

The same pace continued through May. In the laboratory, Callen analyzed feces to determine ancient diets; Narciso and a new assistant nibbled away at cataloguing the vast accumulation of artifacts; while Nelken and I started analysis of the collection excavated from El Riego Cave last year. Peterson, helped late in the month by Arvide, continued testing stratified Formative Period sites, Ts204, Ts204D, Ts-204E, Ts367, Ts368A, and Ts368B. Garcia finished the excavation of Purron Cave, Tc272. Chadwick, during the last week of April, was assigned the task of finishing up the excavation of Coxcatlan Cave, Tc-50, a job estimated as taking three, or at most, four days. However, as new important features kept turning up, this little task took five weeks. During the last weekends of May, Miss Cynthia Irwin, a graduate student at Harvard University, conferred with Nelken and me about the classification of projectile points in Mexico.

At the beginning of June, Callen, Garcia, Nelken and I left the project. Chadwick and Arvide left later in the month after assisting Peterson with excavation of Ts368 and the testing of a Classic Period site. Mr. Kent Flannery, a student at the University of Chicago, joined the expedition to begin studies of modern fauna and the archaeological bones.

This review of personnel and activities completes my summary of the field work of the second season of the Tehuacan Project.

Perhaps by now, the reader may be curious about just what we did find in each excavation, the results of analyses, and the bearing these may have on the solution of our archaeological problems. In the following paragraphs I will attempt to summarize this information. Let me say at the outset that this summary is tentative. Further, in this progress report covering many more excavations than last year, I shall not attempt to describe in detail our excavation technique--about the same as that described in the First Annual Report--nor will I be able to supplement the site descriptions with maps or cross section drawings, etc. Be that as it may, I believe the general picture presented here is about ninety percent correct. We hope for a higher degree of accuracy in our final reports!

The most important, productive, and best excavated site of this field season was again Coxcatlan Cave, Tc50. The large rectangular hole dug in 1961 was expanded both east and west. In the center of the cave we deepened the previous excavation well down into what we had thought was the floor of the cave. The earliest occupations (1 and 2) were charcoal floors capping zones R-w and S-w which we had uncovered last season in the west end of our excavations. This season's excavation uncovered only a little more evidence of these brief, small occupations. These zones contained El Riego and Lerma points, snub-nosed end-scrapers, gravers, choppers, prismatic blades with unprepared striking platforms and side-scrapers--all assignable to the

Fig. 2. Coxcatlan Cave. Excavation of the eastern end is in progress.

Ajuereado complex. Also, taken from these zones were a number of animal bones and pollen samples which should, upon analysis, yield interesting results.

Overlying Zone R-w in the west was Zone Q with a well-defined floor. Towards the center of the cave the new excavations revealed that below this Zone Q, overlying the supposed rock floor, were two zones of refuse well down in the rock; these we called Zones T and U. In the east end of the cave, Zone Q overlay five more occupation zones with well-defined floors that were called R-e, S1, S2, S3, and S4 because of their sequential position. This year Zone Q yielded few, if any, new Ajuereado types and many more artifacts such as scraping planes, pestles, stone bowls, blades with prepared striking platforms, concave-based and stemmed points, etc.--all El Riego types. Thus, our previous identification of this zone as a late Ajuereado occupation during its transition to El Riego should probably be changed, for it may be more correctly interpreted as an El Riego occupation just after its transition from Ajuereado. Further, Zone R-e, S1, S2, S3, and S4, all under Q in the east end, contained mainly El Riego artifacts with only a few Ajuereado tools. Thus, our new excavations revealed a relatively complex stratigraphic situation.

On the basis of our present limited study we have reconstructed the situation as follows. After the Ajuereado occupation (1 and 2 of Zone R-w and S-w) in the west end of the cave there were five brief occupations in the east end of the cave (4, 5, 6, 7, 8) by small groups of people with an El Riego cultural complex. These formed Zones S4, S3, S2, and S1 and R-e. Next, a relatively large occupation by El Riego peoples laid down Zone Q that extended from the east end to the west end of the cave and covered, as well, the loose rock in the center of the cave. Some charcoal and bones from occupation 9 or Zone Q, perhaps with some earlier charcoal, seeped down into crevices in the rock in the center of the cave to form Zones T and U. Both lack artifacts and hearth areas and have a folded or crumpled appearance. Zone T has been dated as 6675 B.C. ± 220 (I 571), while Zone Q has been dated as 6600 B.C. ± 250 (I 461).

Later, at about 5850 B.C. ± 250 (I 574) a relatively small group of El Riego peoples occupied the center and western end of the cave to form Zone P (occupation 10). After that a larger group spread the refuse of Zone O over the entire floor, built, as well, three fireplaces, and left a cache of scraper planes, stone pestles and stone bowls. At about 5750 B.C. ± 250 (I 458) another group of El Riego people occupied the whole cave and formed Zone N. During their stay, three extended burials were placed in a pit in the east end of the cave. The burials were those of a child underneath an adult male placed next to a young adult female. Since the chances are slim that all of this "family" of slightly different ages would die naturally at exactly the same time and, further, that the child's skull would be badly smashed, one suspects

that there was some sort of dirty work afoot. Is this not perhaps evidence of human sacrifice? The burial further hints that some fairly elaborate burial ritual may have taken place during this twelfth occupation. The pit was lined with grass, and perhaps vegetal food. Remains of some sort of net and cloth wrapping were found with each body. Baskets had been placed both above and below the head and chest regions of each. There is evidence that red paint was sprinkled on the female. The upper portion of the body of the adult male was partially burned after it was laid in the grass-lined pit.

It is also from this twelfth occupation that we first get any hint of the subsistence of the El Riego peoples. Preserved vegetal remains and feces reveal that these people were mainly collectors of wild plants who were also using domesticated squash (either mixta or moschata) and perhaps domesticated chile.

Zone M covered the twelfth occupation of the cave from end to end and contained a large sample of tools of El Riego types. Besides hearths and three cache pits, one portion of the refuse in this layer contained a large amount of flint chips and broken artifacts. Also, in the east end there were two child burials which hint at elaborate burial rituals. Here a large pit had been dug; in it was put the extended body of a child wrapped in a blanket and net. Next, a basket or baskets were placed over the body. The head, a few cervical vertebrae and a string of beads, in a basket covered by another basket, were placed near the shoulders of the headless body. The pit was then partially filled (perhaps mainly with vegetal remains) and a second headless body placed on it. This body was wrapped in a blanket and the legs were flexed or bound inside a net. Baskets were placed over the chest and nine baskets were placed below the feet just above the first burial. The skull (perhaps also in a basket) was then placed in the pit near the right shoulder. Previous to its interment, the skull was scraped to remove the flesh, the occipital region broken in and the skull burned or roasted --perhaps to boil the brains so they would be more palatable. The people who laid down Zone M, like those who laid down Zone N, subsisted mainly on wild plants, perhaps including wild corn. They also used squash and chile.

Zone L occurred in the west end of the cave and consisted of rockfill with some patches of refuse in it; whether or not it is a true occupation is open to question. The few artifacts obtained appear to be El Riego types.

Zone K, occupation 14, dated at 5050 B.C. ± 220 (I 457) saw the transition to a new culture type called Coxcatlan. Though a few older El Riego artifact types such as stone bowls, scraper planes, and blades still occurred, the greater majority of the artifacts were new--small barbed point types, ovoid choppers, discoidal choppers and scrapers, milling stones, manos, gouges as well as many other new forms of tools. Subsistence was still based mainly on wild plants, but chile,

squash (moschata), and wild corn in the first stage of domestication were used. This zone extended over the whole cave floor.

Zones I and J contained abundant Coxcatlan type artifacts. The two strata which had been relatively easy to differentiate in excavations in the center of the cave during the previous year, became complicated as we dug farther east and west. Zone J, occupation 15, in the east and center of the cave was a relatively well-defined charcoal floor over an ash layer. It was well-separated by an ash and dust layer from the overlying charcoal floor of Zone I; however, as we dug westward the ash and dust layer between I and J became thinner and thinner. Also, Zone I became thicker and thicker and eventually was a dark gray stratum over 30 cm. thick. Until we have done more analysis it is difficult to determine whether J died out to the west or imperceptibly blended into the bottom of the thick dark zone which we called Zone I in the west. A radiocarbon date of 4975 B.C. ± 200 (I 567), for the bottom of the thick dark zone in the west makes me suspect that Zone I blended into Zone J and became the bottom of it. A top portion of this thick Zone I has been dated at 4375 B.C. ± 200 (I 459) and 3600 B.C. ± 250 (M 1089).

Zone I also became complicated. In the west it was relatively thick, with no noticeable burned floors, but as we dug eastward three zones began to appear. So far we are unable to tell whether there are three eastern divisions equivalent to whole Zone I to the west, or whether the two top zones in the east just barely overlay the top of a much thinned out Zone I. Two radiocarbon dates--3000 B.C. ± 200 (I 594) and 3200 B.C. ± 220 (I 593)--favor the later alternative. Regardless of what it is, the top of this Zone I is occupation 18. It must be added here that the few artifacts and foodstuffs I saw from Zone Super I or occupation 18 are slightly different from those from below. There are more and larger corncobs, a few possible gourd seeds, and maybe some beans. The projectile points are also more frequently Garyito types. Thus there is the possibility that this zone may not be of the Coxcatlan culture but a new one called Abejas.

Complicated as the above may sound, I feel sure that once we have analyzed the materials, studied the profile drawing and photographs and obtained radiocarbon dates for the east section of the cave, the reconstruction of the sequence of occupation will be fairly clear.

Overlying Zone I or Super-I was Zone H. This again bifurcated in the east end of the cave into two zones--occupations 19 and 20. Furthermore, sherds from Zone H included ones that were diagnostic of the Santa Maria phase; while the earlier ones were generalized utilitarian wares common to both Ajalpan and Santa Maria. Thus, we reassigned these zones to the Santa Maria phase. This reclassification, supported by further artifacts and radiocarbon analysis, lengthened considerably the original estimated gap of 1000 years between Zone H and I. It must be added that no strata or stratigraphic evidence gave a hint of events during this long period when the cave was not occupied.

Fig. 3. Coxcatlan Cave. Burial, Zone H-H1: a, skull of adolescent and gaudily striped blanket, as cleaned in the laboratory; b, burial in situ.

The cultural material from Zone H and H1 was radically different from that of the lower layers. There were, besides the Monte Alban grey ware sherds, new types of stemmed and side notched points, metates and manos, obsidian blades, woven cotton cloth, sandals, small end-scrapers, and many other items. Food remains and feces indicate that agriculture was the basis of subsistence during the Santa Maria phase. Crops included corn, beans, squash, pumpkins, chile, zapotes, and possibly tomatoes. Of particular interest was an extended burial in the east end of the cave. The adolescent extended burial or mummy had first been wrapped in two gaudily colored striped blankets. Next, it was laid on two long sticks, then wrapped in a piece of bark cloth and the whole package tied together. Finally, it was placed in a long shallow pit and series of large flat slabs of rock were laid over it to form a sloping roof over its left side.

Above it, Zone G divided into two occupations, 21 and 22. This layer, which extended over the whole cave, was characterized by a series of storage and roasting pits. The pottery was like that of Monte Alban III and the other artifacts and foodstuffs were typical of our Classic period, the Palo Blanco phase.

Above these was a series of floors and zones with post-Classic Venta Salada tools and foodstuffs. They extended over most of the cave floor. They were Zone F, occupation 23; Zone E, occupation 24; Zone D, occupation 25; Zone C, occupation 26; Zone B, occupation 27 and Zone A1, occupation 28. Most of them disappeared as we dug east and westward and added little new to what we had found the previous season.

By the end of the season almost all the cave floor with well-defined stratigraphy had been excavated; many thousands of artifacts, and much foodstuff had been uncovered. Probably many more artifacts exist in the stratigraphically poorer parts of the undug floor and talus slope. It was decided, however, that excavation of these deposits would not repay the effort at the present time.

In terms of culture sequence we had uncovered 28 occupations or components belonging to the Ajuereado, El Riego, Coxcatlan, Santa Maria, Palo Blanco, and Venta Salada cultural complexes. One possibly belongs to the Abejas complex. There was good evidence of cultural continuity for all except for the gap between Abejas and Santa Maria. This gap we endeavored to fill by the excavation of Purron Cave Tc272.

Purron Cave was situated about five kilometers south of Coxcatlan Cave in the same system of hills and cliffs. It was a relatively small cave about 20 meters long and five to six meters wide with a roof that was never higher than about six meters. It was at the foot of a small cliff at the end of a box canyon that led into the Arroyo de Lencho Diego. It had been found by Peterson. Garcia, Arvide, and I supervised its excavation; Garcia did the bulk of the work. From many standpoints its stratigraphy was clearer than that in any other cave we dug. In its deepest portion, cultural materials extended down to a depth of almost

six meters. Unfortunately, nowhere was it as rich in artifacts nor were perishable materials preserved as well as they were in Coxcatlan. Our excavation was 16 meters long and five meters wide to a depth of from two to six meters. No analysis has been done and only a little of the material has been catalogued. As a consequence, what I shall relate here is based entirely on my observations of the material as it came out of the ground in the field.

Zone U, occupation 1, was a thin, small layer of charcoal overlying the rock floor of the cave. A thick layer of yellow soil and rock-fill capped by a burned silty floor, constituting Zone T, occupation 2 lay above Zone U. A similar sterile zone capped by a charcoal floor, Zone S, occupation 3 lay above Zone T. Both of these floors were about four meters in diameter, directly one above the other and in the south-central portion of the excavation. Artifacts, chips, and bones were very rarely found in these layers. A thin layer of silt capping these floors was overlain by a thick (10 cm.) layer of burned soil, ash, charcoal and burned rock. This Zone R, occupation 4, covered most of the south half of the cave. It contained a few scraper planes, side-scrapers, manos, and pestles as well as an extended burial of an adult in a shallow pit. Above it was a layer of yellow soil 30 cm. thick capped by charcoal, Zone Q, and, right above it another burned layer, Zone Q1. Both extended over an area about seven by three meters. A flexed, possibly secondary, burial extended down from Zone Q; both occupations 5 and 6 contained artifacts, animal bones, and burned human bones. The meager sample of artifacts and burials suggests that all these floors of Zone Q1 to U were of the El Riego phase.

Above the El Riego occupations were three zones (N, O, P), each capped by floors, covering the more southerly two-thirds of the cave. A bundle burial and very few artifacts occurred in them. One can only guess what cultural phase they belong to.

Zone N1, M, M1, and L were a series of floors in the south half of the cave, each separated from the next by thick sterile layers of dirt and rock-fill. These burned layers represent occupations 10 to 13. Artifacts and bones were not numerous. However, crude flint blades and obsidian blades, the latter struck off cylindrical polyhedral cores, oval or cylindrical shaped manos, end-of-blade scrapers, a fragment, possibly from a stone bowl, a small fragment of a Garyito or Coxcatlan point and oblong shallow metates strongly suggest that these floors are Abejas components. There is a radiocarbon date of 2775 B.C. ± 190 (I 572) for Zone L, occupation 13.

Just above occupation 13 in the lower dirt section of Zone K was our first potsherd. The floor belonging to Zone K covered the southern half of the cave, resolving, in the more southerly quarter into two floors, K and K1. A series of roasting pits and hearths extended down from both occupation layers 14 and 15. In all parts of these two zones were grit- and gravel-tempered potsherds. Also present were obsidian

Fig. 4. Purron Cave. a, Profile E3, between S4 and S8; b, Burial 2, Zone Q1, Square S1E4; c, Burial 4, Zone R, Square 4, the deepest burial in Purron Cave.

blades, side-scrapers, small end-scrapers, stone bowls, ovoid manos, and oblong footless metates. This distinctive assemblage forms the basis for the Purron complex. A few corncobs in this layer indicate that these people were full time agriculturists.

A few inches above occupation 15 was the charcoal floor at the top of Zone J. It has been dated as 1500 B.C. ± 175 (I 570). Here were many sherds mainly with grit temper and smoothed surfaces; I observed none with paint. The sherds, scrapers, blades, manos, and metates indicate that the floor is either a Coatepec or an early Ajalpan component. The floor above it, Zone I, occupation 16, contains similar sherds and artifacts. With these remains, however, were three or four red sherds that are diagnostic of the Ajalpan phase. This has been dated as 1380 B.C. ± 170 (I 565). A large portion of the vegetal food remains in both occupations consists of corncobs with evidence of introgression by teosinte. Both floors extended over most of our area of excavation.

Right above them were the ash and charcoal floors of Zones G and H. Here black sherds and white sherds with interrupted lines on their inner rims suggest that we are dealing with an early Santa Maria component. The radiocarbon dates from Zone H as yet are equivocal. We estimate it dates to about 500 B.C. Zone F covered only a small portion of the north part of the cave. Its Monte Alban gray sherds were not sufficiently distinctive to place it exactly as to cultural phase.

In the upper half-meter were five more zones and occupations 21 to 25. The sherds from all these floors are of the Classic period, Palo Blanco; in the refuse were well-preserved vegetal materials. Cotton cloth, string, nets, bark cloth, sandals, obsidian blades, metates, manos, and one fragment of a small side-notched projectile point occurred along with abundant food remains, including corn, squash, and beans.

The middle layers of Purron Cave supplement those of Coxcatlan Cave. Between the two we have occupations representing every stage of our sequence. Ajuereado components occurred only in Coxcatlan Cave but El Riego people occupied both caves. The Coxcatlan phase is well-represented only in Coxcatlan Cave Tc50, but perhaps Zones N, O, and P of Purron may belong to it. The Abejas, Purron, Coatepec, and Ajalpan phases all appear in the middle levels of Purron while Santa Maria and Palo Blanco occur in both rock shelters. The post-Classic Venta Salada phase was present only in Coxcatlan Cave. Thus, the skeletal framework of our chronology appeared in these two caves; the other excavation to be described shortly added the flesh.

The excavation of San Marcos Cave, Tc254, added most important new data on the early domestication of corn and confirmed, as well, the stratigraphy found in Purron and Coxcatlan. Tc254 is situated at the bottom of Tecorral Canyon about eight kilometers west of Tehuacan. The cave itself is long (20 meters) and narrow (5 meters) with little

Fig. 5. San Marcos Cave. The crew at work.

headroom except at the edge of its overhang. The area of excavation conformed somewhat to the general shape of the cave, being ten meters long and reaching a maximum width of four meters in the center of the cave; it was never more than 1.2 meters deep.

During the excavation my daily answer as to how we were doing was usually "Well, the botanist had a good day". This pretty much characterized our finding--excellent vegetal material but few artifacts. For the most part, the stratigraphy was hard to discern because of roof fall and the fact that the rock floor was sloping.

The earliest occupation on the floor of the cave was a thin layer of rock-fill capped by an ash floor (Zone F, floor 5). It covered only an area about two by three and a half meters in the east end of the cave. The vegetal material and bones indicate that these people were mainly plant collectors. The few tiny corncobs that occurred are probably from wild corn. The sparsity of artifacts uncovered makes it difficult to determine cultural affiliations but the fact that the floor lies below Zone E makes us suspect that it is of the El Riego time period.

A layer 30 cm. thick, comprising rock-fill capped by a vegetal floor (Zone E, floor 4) covered this primary occupation. It was slightly more extensive, covering an area roughly two by six meters. Foodstuffs indicate that these people were primarily plant collectors who also practiced rudimentary agriculture to some extent, as is shown by a few squash remains and about 50 small (about 2 cm. long) corncobs. Mangelsdorf considers these to be cobs of wild corn or corn in the first stage of domestication and slightly more primitive than anything we had previously found in Coxcatlan. The artifacts comprised blades, side-scrapers, choppers, gouges, and scraper planes. Although further analysis is needed, this second occupation would seem to be either very late El Riego or very early Coxcatlan. A radiocarbon date of 4150 B.C. ± 200 (I 573) seems to indicate it is the later.

Directly covering floor 4 was a layer (30 to 40 cm. thick) of rock-fill and another vegetal floor (Zone D, floor 3) of the same dimensions. The food remains show these people to have been basically plant collectors but there is more evidence of agriculture--remains of gourds, squash, and corn. Further, the corn seems to have been of the Bat Cave or pre-Chapalote race--the earliest race found in the area. The five obsidian blades, scrapers, and fragments of well-made metates and manos suggest that this third occupation was by Abejas peoples. The floor has been dated as 3300 B.C. ± 250 (I 569).

Over floor 3 in the east end of the cave and over the rock floor in the west end of the excavation was a layer of rock-fill 20 cm. thick containing a few flint artifacts, vegetal material, as well as a large proportion of corncobs showing teosinte introgression. Although the cobs are much like those of the Formative period elsewhere, there were no sherds or any definite occupational floors. The layer, Zone C, has been dated as 1025 B.C. ± 200 (I 566). Quite frankly, I cannot under-

stand how this level was formed and am perplexed by its content. It is most difficult for me to understand how the artifacts, vegetal material and Formative period corncobs could have been deposited in this rock-fill during Middle Formative time with no evidence of definite occupation and without potsherds.

Capping Zone C was floor 2 as well as floor 1, Zone B. Both covered the entire cave floor, had numerous hearths and pits in them and typical Palo Blanco artifacts and sherds. Foodstuffs were abundant. Subsistence was predominately based on agriculture, modern corn races, beans, squash, gourds, chile, and tomatoes being represented.

Just around the corner from Tc254 was a smaller cave, Tc255. There we made an excavation roughly five meters long, four meters wide, and one meter deep. The top floor layer contained remains of the Classic period almost identical to those in Floor 1, Zone B of San Marcos Cave. Below these remains were a few chipped stone artifacts in yellow soils and rock-fill. These seem to have been left by a pre-ceramic people, but exactly which ones we do not know as we have not analyzed, washed, or catalogued this meager material. Garcia had the misfortune to dig this cave while I excavated the nearby San Marcos Cave.

The last cave excavated this season was called Abejas Cave, Tc307. It was situated just east of Purron Cave at the mouth of Purron Canyon but facing the main arroyo. In this area a long overhanging cliff faces the main arroyo and runs for a distance of about 300 meters. At the foot of the cliff is usually an area from one to five meters wide, sheltered by the overhang. One wider (5 meters) protected area, about 15 meters long, occupied by prehistoric man was designated Tc307. Initially I tested it, then Arvide and I began excavation and he finished it. A triangular area roughly five meters by seven meters by nine meters was dug to a depth of from two to three meters.

Since the artifacts from the top levels of this cave were much more abundant than those in the lower levels I shall discuss the stratigraphy in the opposite manner from the previous descriptions. Zone A, occupation 7, was a thin (10 cm.) layer of carbon and rock-fill that capped the whole cave. It contained a few artifacts and sherds of the Palo Blanco phase. About 40 cm. below it was another charcoal floor that extended over most of the area of excavation. In a general portion of the excavation, this floor divided into two parts, thus forming Zones B1 and B. The floors contained side-scrapers, small end-scrapers, blades made of flint and obsidian, cylindrical polyhedral cores, ovoid manos, oblong footless metates, finely made stone bowls, Ensor, Coxcatlan, Flacco, Garyito, and San Nicholas--a variant of Almagre--points. These two floors are the type stations of the Abejas complex.

Below these floors was a layer of rocks that had fallen from the roof of the cave, Zone C. This layer of rock was very much thicker in the interior of the cave than at its mouth. In most of the cave the rocks

capped a layer of refuse (Zone D) and in the middle of the area of excavation there was a charcoal floor over another layer of refuse (Zone D1, occupation 4). Both these layers thickened toward the mouth of the cave. Though the artifacts were less numerous, they seemed to be similar to those of Zones B and B1.

Zones E and F occurred only in the center of the excavation. They were burned areas capping lenses of refuse. Zone G was an ash floor over about 40 cm. of refuse in the center of the cave, near its mouth, while Zone H was another thick layer of refuse in a two-square-meter area at the mouth of the cave. Artifacts from these zones were scarce and I only saw a few of them during the excavation. My general impression was that they contained either Coxcatlan or El Riego types. Further study of the collection will be made during the next season.

Ts51 was located on a terrace just to the north and east of the talus slope in front of Coxcatlan Cave, Tc50. Though I had tested it, most of the excavation here was under the direction of Fowler, assisted by Arvide. The excavation consisted of a trench 25 meters long and one meter wide, along the terrace. It was intersected by four trenches from the edge of the arroyo bank. The main trench was from two to three meters deep. Although there were a number of soil zones in the area, only one seems to have been intensively occupied. Only this zone and one above it contained many artifacts.

The earliest zone (F) was gravel, deposited by the stream that once flowed in the arroyo in front of the site. Above it was a thick layer of yellow silt (Zone E). Near the top of this zone were patches of fired soil connecting four well-defined charcoal-filled hearths. Associated with the hearths and the connecting reddish earth were a large number of artifacts. These included the following forms of points: Agate Basin, El Reigo, Kent--or la Mina, Gary--or Trinidad or Hidalgo, and Tortugas; scraping planes; blades, mullers, stone bowls or mortars; and pestles. This assemblage seems to indicate that the first occupants of the site were El Riego peoples.

Above Zone E was a hard compact darker layer (Zone D) with many similar artifacts in it. Whether or not this is another El Riego occupation has not been determined. Above this zone was a very thick yellow compact soil zone (C) with few, if any, artifacts in it. About 40 cm. from the surface a dark zone (B) occurred and in it were pits containing Palo Blanco sherds, charcoal and fire-cracked rock. No floors were apparent nor were there many artifacts outside the pits. The top zone (A) was the present humus.

Most of the other major stratigraphic excavations or tests were made in the area of the brickyard just south of Ajalpan. The primary excavation was made in the northern part of this area at site Ts204. Here the walls of a peninsula-like cut revealed good stratigraphy of the Formative period; initially we thought it overlay pre-ceramic remains. To insure good stratigraphic control of our excavation we first cleared

off three sides of a block nine by ten by ten meters. Then we completely excavated a six by six by nine meter portion of this block by stripping off the horizontal natural strata against the profiles. In this manner, we could usually see and strip off strata or floors from two or three vertical profiles. This technique insured maximum control and avoided digging by arbitrary levels.

A preliminary study of the soil profiles, profile drawings, and profile photos in conjunction with a glance at the sherds reveals the following picture. First, the original lensed clay and sand strata had been gouged out in this area by natural agencies to form a depression about 20 meters in diameter with a maximum depth of about 1.5 meters. These lower original strata were called Zone I. Next, peoples lived in the center of this depression and laid down refuse capped by an ash floor (Zone H). In Zone H were found numerous unpainted and undecorated well-made sherds--usually from tecomate vessels--as well as many fragments of stone bowls, oval manos, oblong footless metates, obsidian blades and contracting-stem points. None of the sherds I saw were decorated nor were there any figurines. For the moment, we are calling this assemblage the Coatepec complex; it appears related to remains from Zone J in Purron Cave. In the exact center of the depression, over the ash floor, were two or three lenses of waterlaid clay called super-H. Thus, there must have been a time after the deposition of ash of Zone H when Ts204 was a large mud puddle.

After this puddle dried up, more refuse (Zone G) was dumped in the depression; an ash and burned floor formed on top of it (Zone G1). Then came more refuse (Zone F) capped by a charcoal and burned rock-filled floor (Zone F1). Artifacts and sherds were abundant and are the basis on which we formulated the early Ajalpan phase. The sherds are mainly of thick grit-tempered tecomates that were sometimes decorated with zone brushing or red paint around their outer rims. A few sherds of flat-bottomed outflaring bowls occurred. Their exterior surfaces often were painted red; sometimes there was a red strip on the interior or exterior of their rims. There were also a few sherds of black, or dark gray, ware. The stone work was like that of Zone H, though there were proportionately less stone bowls. Figurines fell into two general classes--small, extremely crude ones with rectangular punched edges, unlike any I know of, and large, naturalistic ones like those found in Chiapa de Corzo I, Cotorra phase, and in early Ponce; bodies are small and crude or large and hollow.

Above the third floor (Zone F1) was a thin layer of refuse (Zone E) with slightly different materials, many of which were waterworn. Although most of the older types occurred, there were more fragments of hollow figurines and black wares in addition to some white-ware sherds. After this period, the depression became a mud puddle again and waterlaid lenses were laid down in it. There was a layer of burned clay in the middle of the lenses that caused us to call them Zones C and D.

Fig. 6. Ajalpan. a, Alternate squares expose strata at Ts204; b, Bell-shaped pit at Ts204C. Outline of shaft can be seen in wall.

Sherds were rare but those found were like those from Zone E. These waterlaid deposits completed the filling of the depression; above them was a fine gray silty clay layer (Zones A and B) about one meter thick without features. It contained some lenses of gravel, along with badly eroded and waterworn sherds of white ware and gray wares, like those of Monte Alban I. These materials seem to belong to the Santa Maria phase. I originally tested the site. Byers, Peterson and I initiated the excavation; Peterson finished it.

During the early part of the digging of Ts204 one of our workmen accidently found a large hollow figurine nearby at a test we call Ts204C. Mr. and Mrs. Byers took charge of the salvage of this figurine and associated materials. Here they found that a large bell-shaped pit had been dug into Zone I. A skeleton, a large hollow Morelos-type figurine, and some rocks had been placed in its bottom. Next, the pit had been filled with refuse of the Ajalpan phase. Among this refuse were some zoned-dentate-stamp sherds. Above the pit, gray clays, like Zones A and B of Ts204, were formed. Though the sherds have not been completely analyzed, the pit seems to be of Late Ajalpan times--like Zones E and F1 of Ts204. There is, however, the chance that it was much later and merely filled with late Ajalpan sherds.

Near the end of the excavation of Ts204, Peterson made a test about 100 meters to the west, at a spot where I had cleared off a wall showing a large pit. This was designated as Ts204D; eight one-meter squares were dug in it to a depth of about 1.5 meters. The top one meter was gray clay (Zone A) like the top of Ts204 and Ts204C which contained Santa Maria materials. Zone B was a large shallow pit containing mainly Ajalpan tecomate and red wares like Zones E, F, and G of Ts204, but more dentate-stamped sherds, more black ware sherds, some figurines with filleted features, and new vessel forms suggest that it is late Ajalpan. Zone B had been dug into refuse of Zone C that was typically early Ajalpan. This overlay strata like Zone I of Ts204.

Another small island of aboriginal refuse, left by clay diggers about 250 meters northeast of Ts204, was called Ts204E. Here there were no discernable strata and a number of squares were dug to a depth of about three meters in arbitrary 20 cm. levels. The upper materials seem to be of the Santa Maria phase while the earliest levels were red ware like Ajalpan. These conclusions, however, are not too reliable because of the method of excavation--arbitrary levels often result in arbitrary conclusions about general cultural trends and not in good sequences of cultural complexes.

About a kilometer south-southwest of these Ajalpan digs, people digging clay had dumped a great quantity of sherds and figurines like those from Zones B, C, and D of Ts204 and left as well standing banks with obvious strata in them. Initially, Peterson and his crew cleaned off the banks of the borrow pits for a distance of about 200 yards. Some tests were cut into the banks to determine the region of best stratig-

raphy. After this Peterson, with Arvide assisting him, dug a block four by seven meters to a depth of about 1.5 meters. This area, designated Ts367, was called by the local men the "Canoas site". Materials came out by the potato sackful so that what I say here is mostly based on impressions. Zone A was a dark gray top stratum with no features, containing mainly post-Classic Venta Salada sherds. Zone B was a lighter layer with mixed post-Classic and Formative sherds. Zone C, however, was a definite charcoal floor or occupational layer with hearths, etc. Artifacts included stemmed points, legged metates, cylindrical manos, figurines like the D type from the Valley of Mexico, gray sherds like those of Monte Alban I, as well as black ware like La Venta black ware, white ware and red wares like those from Tlatilco, and some red-on-white and white-on-red bichromes. Many of the sherds were from bowls with thickened incised rims; on the bottom of the interior of others were incised grater decorations. Underneath it was another refuse layer with pits extending down from it, called Zone D. In it was similar material. The bottom layer was an ash floor and it, again, contained similar ceramic remains. However, there were differences in that figurines like the C1 and C3 types of the Valley of Mexico appeared, less gray ware and black ware occurred and there were some black sherds with incising filled with red paint. The artifacts from the first three occupations (Zones D1, D and C) are considered to be components of the early Santa Maria phase. The sherds are like those from Zone H of Purron Cave.

The last excavation at a stratified site took place about one kilometer south and east of Canoas near a large mound called Coatepec. It was numbered Ts368. Peterson and Arvide began excavation there during my last week in Tehuacan so I do not know its stratigraphy well. Two areas were dug and one of these went to a depth of 5.5 meters through a series of floors and zones (from A to H). From the lower zones came material like that from Zones C, D and D1 at Ts367; the upper zones contained sherds of gray ware like Monte Alban I as well as Ticoman-like figurines. Coatepec seems to be composed of a series of Santa Maria components.

This completes my description of the stratified sites excavated in 1962. This information together with that found in the two parts of El Riego Cave, Tc35E and Tc35W, are the stratigraphic basis for our sequence in the Tehuacan region. Tests in two post-Classic sites last year and in one Classic site and one post-Classic salt industry site this year gave us additional material for certain of the late phases. Information from the 373 sites found in survey, also, supplement the above data. On the following page I have put in chart form this data concerning the tentative sequence of the area. Also included are the radiocarbon dates and my tentative time estimates.

Roughly, our sites and excavated components line up in the following manner. The Ajuereado complex or phase is represented by two

CULTURAL COMPLEXES	Excavated Sites with Stratified Zones												Number of excavated possible components	Number of possible components found in tests.	Number of possible components from surface survey	TOTALS
	Coxcatlan Cave (Tc 50)	Purron Cave (Tc 272)	West El Riego Cave (Tc 35)	Coxcatlan Terrace (Ts 51)	San Marcos Cave (Tc 254)	Abejas Cave (Tc 307)	Tecorral Cave (Tc 255)	Ajalpan Main Test (Ts 204)	Ajalpan Test (Tc 204D)	Ajalpan Test (Tc 204E)	La Canoa (Ts 367)	East El Riego Cave (Tc 35)				
dates	zones	zones	zones	zones	zones	zones	zones	zones	zones	zones	zones	zones				
1500 A.D.	A															
	B		1	A			A				A	A	12	10	192	214
Venta Salada	C	A?									B	B				
1000 A.D.	D															
	E															
	F															
		B														
	G1	C			A							C				
Palo Blanco		D	2	B	B	A	B					D	16	13	150	179
0	G	E	3									E				
		F						A				F				
Santa Maria	H1	G						B	A	Upper Levels	C					
	H	$H^{xx?}$						C-D			D1		9	6	15	30
1000 B.C.								E			D					
					C^{x}			F	B							
Ajalpan		I^{x}						G	C	Lower Levels			6	2	0	8
Coatepec		J^{x}						$H^{x?}$					2	0	0	2
2000 B.C.		K1														
Purron		K											2	0	0	2
		L^{x}				B1										
		M1				B										
3000 B.C.	(S)I^{x}	M				C	C						13	1	0	14
Abejas	(V)I^{x}	N1				D1										
						D										
		N				E										
4000 B.C.						F										
					E^{x}											
Coxcatlan	$I^{x?}$	O		C									12	1	0	13
	J^{x}	P				G										
5000 B.C.	K^{x}		4													
	L	Q1			F	H										
	M															
	N^{x}	Q														
6000 B.C.	O^{x}			D												
	P	R														
El Riego			5										21	1	12	34
	Q^{x}	S														
	T^{x}	T														
7000 B.C.	U,R			E												
	S1,S2	U														
	S3		6?													
Ajuereado	R(w)												2	1	4	7
	$S(w)^{x?}$															
TOTALS	29	25	6	5	6	10	3	7	3	2	5	6	95	30	373	498

Fig. 7. Correlation of cultural complexes with excavated zones from stratifie sites and surface sites. (x, probable radiocarbon date; x?, improbable radio carbon date.)

components from the bottom of Coxcatlan Cave, Tc50--Zones R-w and S-w--and three possible components found in survey. The El Riego phase is represented by 11 components--Zones L through S4--in Tc50; two components--Zones D, E--at Ts51; probably six components--Zones Q1 through U--at Tc292; a possible component--Zone F--in San Marcos Cave, Tc254; one in Zone 5, Tc35 west, as well as others in about 15 surface sites. The Coxcatlan phase is represented by four or five components at Tc50; three or four at Tc272; one or two at Tc254; four or five at Tc307; one in Tc35 and three surface sites. Abejas is poorly represented, with one possible component in Tc50; four in Tc272; one at Tc254; one at Tc255; four at Tc307; and three or four from surface sites. The Purron complex only occurs in Zone K and K1 at Tc272, while the poorly-defined Coatepec complex occurred in Zone H of Ts204 and maybe in Zone J of Tc272. Ajalpan materials occurred in three components at Ts204; two at Ts204D; Zone I of Tc272; and possibly at Ts204C and Ts204E. Santa Maria occurred at about five components of Ts368; three at Ts367; one at Tc35; possibly two at Tc50; three at Tc272; in the upper levels of Ts204; and at about ten surface sites. Palo Blanco components occurred in excavations at Tc50 with two components; one at Ts51; five at Tc272; two at Ts254; one at Ts255; one at Tc35 west, three at Tc35 east; one at Tc307; one at Tc261; two at Ts267; four at tested sites and at about 200 surface sites. All told we have material from about 500 components or occupations.

Besides the field work, the expedition carried on activities in the realm of analysis. As we have said, during the summer and fall of 1961 Narciso and Francisco catalogued specimens secured that season; during the winter of 1962 they catalogued materials from Tc254 and Tc255. In the spring they started the cataloguing of Ts204 and Tc272. Late in the spring we increased the crew in the hope that they might finish cataloguing this year's material so it would be ready for study by next winter. Quite frankly, remembering the pile of bags in the patio and storeroom, I sometimes think we will have to increase the crew to fifty men to get it all done in the next six months!

Due to the fact that most of the excavated artifacts of the first season had been catalogued by December, Nelken was able to analyze them in our new laboratory this season. In this preliminary classification we used the terminology for attributes I had used in my Manitoba report, and as well defined and set up types in much the same manner as I had in the Tamaulipas report. After the modes and types--modes and clusters--were determined, each trial type was described and the measurements of each specimen were placed on "card types" and filed. Further, the specimens were boxed by type, their sequential distribution was recorded on a chart, and type specimens were affixed to a panel on the wall. Initially 900 projectile points were studied; 26 types recognized. Later consultation with Cynthia Irwin, comparisons with Tolstoy's types from the Valley of Mexico and with mine from Tamaulipas,

Fig. 8. Archaeological corncobs, demonstrating the evolution from the most primitive (lower right) to the more developed races.

redefined the initial trial types. This process resulted in recognition of about 32 trial types which belong to about seven systems. A study of about 500 end-scrapers made in the same manner resulted in about 12 trial types. Analysis produced the following results: about 1500 side-scrapers resulted in about eight trial types, approximately 1000 prismatic blades fell into six trial types, some 500 bifaces were divided into 15 trial types; and 200 ground or pecked and ground tools were classified into about 20 trial types. In the course of studies of San Marcos and El Riego Caves we classified some of the string, knots, and wooden tools. During the previous summer Peterson had studied a large sample of sherds from our tests in two Venta Salada sites; these sherds he divided into a number of classes.

Contributions from collaborators include a fine paper by Sra. Irmgard W. Johnson on the textiles found in 1961. She is now studying the remaining fabrics. A careful study of Thin Orange pottery by Sra. Carmen Cook de Leonard has been graciously submitted to us. "Thin Orange", often a trade ware, seems to have been made near our local area and is very common in our Classic period sites.

Under the heading of other analysis must come the results of Dr. C. E. Smith's study of the flora of the Tehuacan Valley during the previous summer. By the end of our season Dr. Smith had two sizeable manuscripts ready for publication, one on the flora and the other on modern agriculture in the Tehuacan Valley. These materials will be used in our final reports and are a sound basis for understanding the prehistoric vegetal remains.

Mr. Frederick Johnson's visit to Tehuacan and his direction of his radiocarbon chronology program was most welcome. So far we have collected about 150 carbon samples; twenty of these have been dated. Johnson's plan of having carbon dating run hand-in-hand with excavation and site analysis has worked out extremely well. Eventually, determination of the 70 dates proposed will provide the Tehuacan area with an unusually well-established, long archaeological chronology. At present, however, the dates available and quoted here permit only tentative estimates of age of some of the levels.

Dr. Eric O. Callen, late in the field season, began a study of the 300 or more feces found in the excavated layers. He dissected about 50, and mounted food fragments on 1,354 microscope slides. We have received a progress report on the study which has contributed valuable information concerning ancient food habits and nutrition. The balance of Dr. Callen's study will be continuing at MacDonald College, Ste. Anne de Bellevue, Quebec.

Dr. Thomas W. Whitaker and Dr. Hugh C. Cutler analyzed over 5,000 cucurbit fragments from the 8000-year period covered by our research. Results of their study are being prepared for publication.

Mr. Kent Flannery arrived in Tehuacan in June to undertake zoological collections in the area. With osteological material obtained from

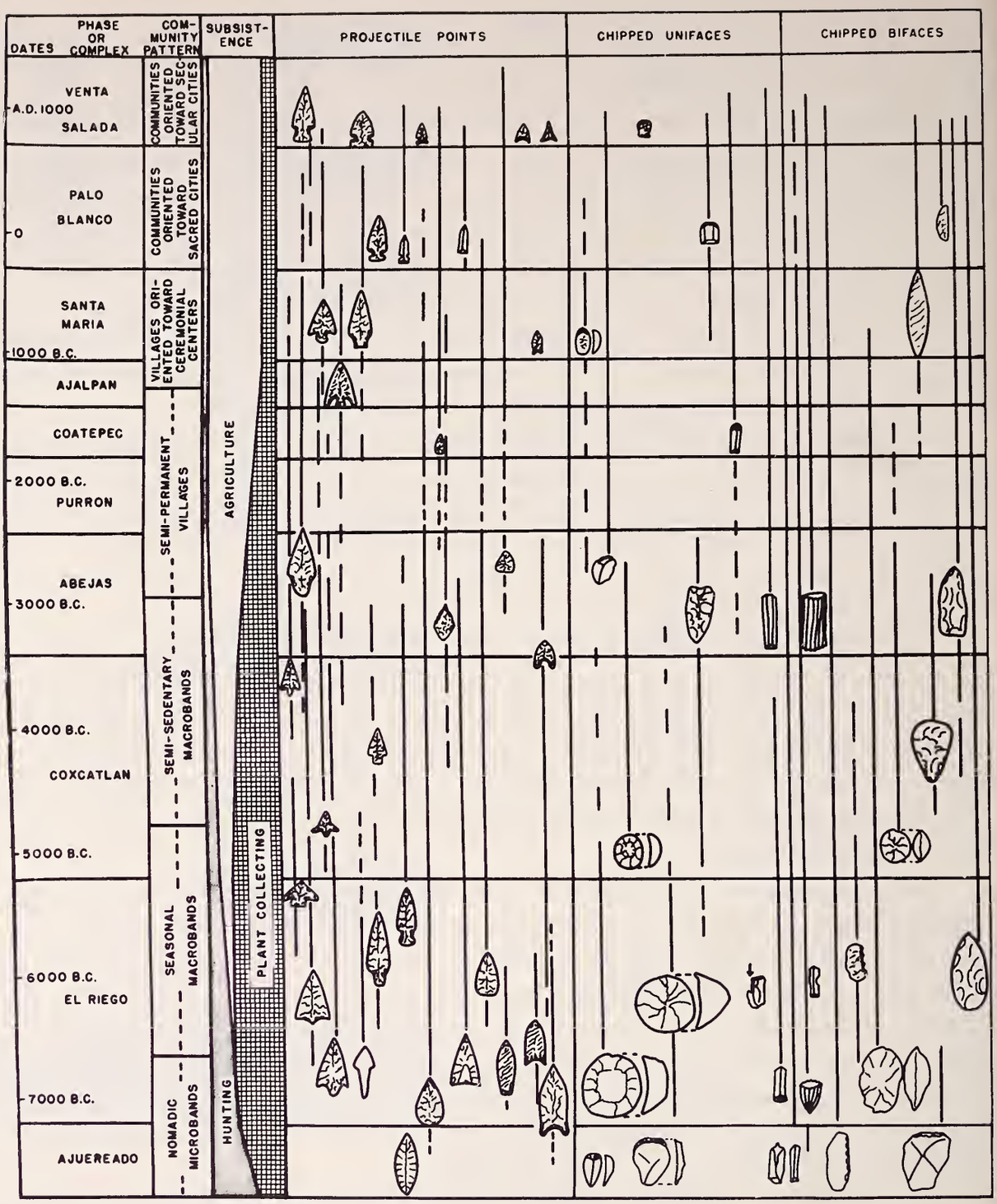
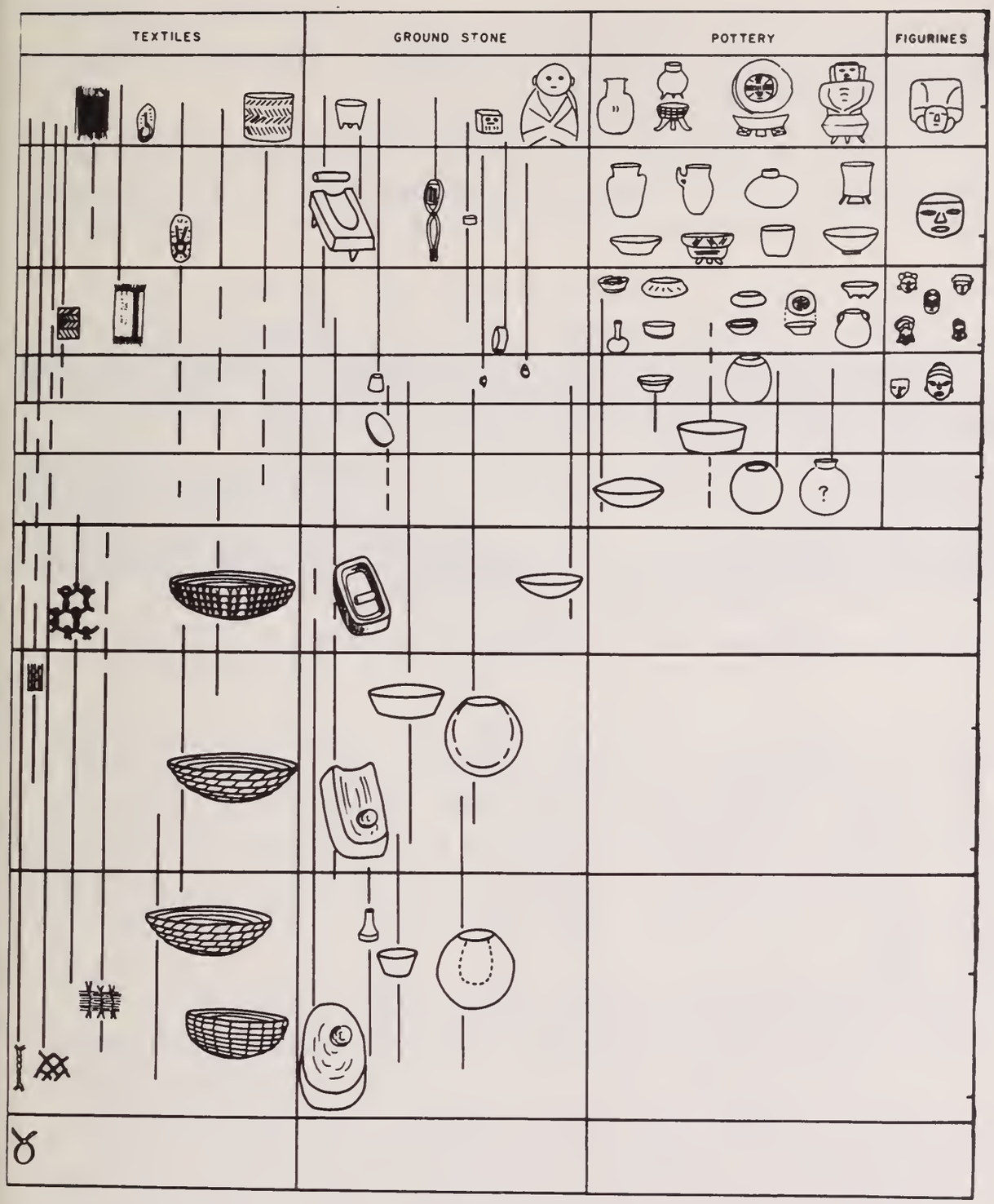


Fig. 9. Sequence of types of artifacts



throughout the Tehuacan stratigraphic column.

this research he will have a sound basis for identifying archaeological bones and recognizing their cultural implications. His preliminary study should be completed this summer.

The pollen study started by Miss Monica Bopp is still being pursued. We should receive a report on the pollen profiles from Coxcatlan Cave shortly. Future pollen studies will be continued on about 10 more profiles by Mr. William Byers and Dr. Paul S. Martin of the University of Arizona.

Dr. Lawrence Kaplan of Roosevelt University has made plans to join the expedition late in the season to study bean remains. Sra. Carmen Cook de Leonard has begun studies of the ethnohistory of the Tehuacan area and has commenced to collect ethnographic data concerning subsistence.

Still under discussion is a cooperative study next year of our archaeological corn by Drs. E. J. Wellhausen and W. H. Hatheway of the Rockefeller Foundation and Drs. Paul C. Mangelsdorf and W. C. Galinat of Harvard University. All four, however, have seen the cobs found this year and all seem agreed that we have a complete sequence from wild corn to modern races, including wild corn in the first stage of domestication, primitive races, and races with teocenti introgression.

In light of our present data from excavation and preliminary analysis are we able tentatively to reconstruct the history of the Tehuacan area? The answer is yes, but not very well. Any statement about the sequence is subject to change as more data is secured and more analysis completed. I feel sure that some of what I will write below will be modified. However, never having valued my academic neck too highly, let me stick it out.

The earliest complex yet found--termed Ajuereado--is not well-documented. I would guess that it would date before 7200 B.C. Although refuse of this complex contained a slightly higher proportion of bone than that of later levels there is some evidence to indicate that at least half the diet of these early people was derived from wild plants. Furthermore, many of the bones from the refuse are those of small animals that would more likely be trapped than hunted. Large projectile points, of course, offer further evidence that some larger animals were hunted.

Evidence concerning settlements or community pattern is meager. However, the few excavated components we do have certainly were laid down by small groups, or microbands. Furthermore, the floors of these components were not only small in area but also thin--possibly indicating occupations of short duration. One might speculate that at this time period there were communities of microbands who changed residence seasonally.

One of the main activities about which we do have evidence is flint knapping. Flakes struck from large nodules by pebble hammerstones,

HYPOTHETICAL STAGE 1

CULTURAL COMPLEXES

Ajuereado

early El Riego.

COMMUNITY PATTERN

Wandering Microbands that changed residence seasonally. i.e. groups who went from wet season camps (○) to fall camps (☆) to dry season camps (★) in an annual cycle.

POPULATION ESTIMATE

3 microbands of 4 to 8 people: the *original population*.

ESTIMATED AGE

before 6800 B.C.

SUBSISTENCE

Food collectors who hunted and trapped and gathered wild plants.

OCCUPATIONS FOUND

7

Fig. 10. A tentative reconstruction of the settlement pattern of the Ajuereado and early El Riego complexes.

were often retouched to form side-scrapers of a number of varieties, unifacial choppers, spokeshaves, gravers, small keeled or plano-convex snub-nosed scrapers and large flat crude end-scrapers. Many of the above are quite large. Blades were also made from crude, perhaps conical, polyhedral cores without retouched striking platforms. Some of these blades were made into end-of-blade scrapers. Some of the large flakes were worked bifacially to form other tools such as lenticular--Lerma--and long concave-based--El Riego--points, ovoid knives and choppers. Most of the bifacial work seems to have been done by percussion; only a small proportion seems to have been done by pressure flaking.

Perishable artifacts have not as yet been found. However, the gravers and scrapers certainly suggest that skins were worked. It would also seem logical to assume that knives, end-scrapers, and spear points were hafted in wood so there might have been a woodworking industry. Evidence from the following El Riego horizon suggests that string, nets, fabrics and baskets of some sort might also have been known.

The El Riego phase is much more fully known. On the basis of four radiocarbon dates it is estimated to have lasted from about 7200 to 5200 B.C. Although only a small amount of the foodstuffs has been analyzed, it would appear that these peoples were primarily collectors of wild plants. Grasses, possibly including wild corn, maguey, agave, fruit of Opuntia cactus, and small seeds were prevalent in the refuse. It is very possible that the kind of plant collected varied with the season.

Because animal bones were rarely found in the rubbish, we judge that the El Riego people did little hunting or trapping. Squash seeds--probably those of moschata but possibly of mixta--and chile indicate early attempts at rudimentary agriculture.

Although we are still studying the material and will have good evidence eventually, I believe that even now we may tentatively reconstruct the settlement pattern for the El Riego phase. It would appear that during the spring and early summer--the wet season--a number of microbands came together to form a macroband at certain places where there were rich food resources such as Opuntia fruits, wild corn, squash, seeds, flowers, etc. However, once this food resource was depleted, perhaps by fall, the group would split into microbands, each then moved out to other locations where fall foods, such as nuts, were to be found. Once these were gone, and the dry season had arrived, the microband probably had to move again to other places, perhaps where Opuntia leaves (Nopal) were to be found. With spring, the groups would once again come together at the place at which they had camped the previous year.

HYPOTHETICAL STAGE 11

CULTURAL COMPLEXES

El Riego

early Coxcatlan

COMMUNITY PATTERN Microbands that coalesce once a year to form seasonal *Macrobands*; i.e. microbands that went from fall camps (☆) to dry season camps (★) to join others at spring macroband camps (◎◎◎)

POPULATION ESTIMATE

4 times the *original population*.

ESTIMATED AGE

6800 to 5000 B. C.

SUBSISTENCE

Plant collectors who occassionally hunted and trapped, and used squash and chlie.

OCCUPATIONS FOUND

ca. 35

Fig. 11. A tentative reconstruction of the settlement pattern of the El Riego and early Coxcatlan complexes.

The flint knapping industry of El Riego is well-represented. These people struck flakes from pebble nodules and ellipsoidal bifacial cores as well as from ellipsoidal cores broken in half. The broken surface of the latter was used as the striking platform. Side-scrapers, burins, end-scrapers, and scraping planes of various types were made from these flakes. Most blades were still made from the simple polyhedral

cores of the previous horizon but some were made from conical polyhedral cores with neatly faceted striking platforms. The bifaces of this period include the following: projectile points with concave bases--Agate Basin, Plainview, El Riego, Flacco and Tortugas; with stems--Gary, Kent and La Mina; with notches--Ensor; and leaf-shaped--Abasolo and Nogales; ovoid knives, choppers, and possibly drills. Percussion flaking was done with pebble hammers and pressure flaking with antler tine flakers.

Some stone tools were made by grinding and pecking. These include: bell-shaped pestles; mortars in the shape of seed jars, or with flat bottoms and outsloping rims; mullers, and pebble manos.

Some perishable remains survived from this period. A few pieces of worked wood were uncovered. String was common in the refuse; it was often used to make full-turned coiled and knotted nets. The El Riego people made coiled baskets with a bundle foundation, using non-interlocking stitches, interlocking stitches, or twined stitches. Burials of this phase were accompanied by pieces of fabric which might have been twined blankets, and by snail shell beads, strung together to form necklaces.

As mentioned previously, burial practices were remarkably complex for people of this subsistence level. Grave goods comprise baskets, blankets, nets, and perhaps food. All burials were in pits. Most burials were extended, although one was flexed. Two were beheaded, two were multiple burials and there were hints of cremation and/or cannibalism and human sacrifice.

The Coxcatlan phase developed directly from the El Riego phase. Five radiocarbon dates place it between 5200 B.C. and 3400 B.C. These people, also, were basically plant collectors who did little hunting or trapping. However, throughout this horizon the proportion of their subsistence derived from agriculture steadily increased. In the early part of this phase they gardened corn, squash--moschata and/or mixta--and chile in small amounts. Later they grew more and bigger corn, as well as small amounts of squash, chile, gourds, amaranth, and possibly beans.

Although the excavated components of this phase were informative, survey data is scanty. Because of this, reconstruction of the settlement pattern is more speculative than that for the El Riego phase.

Generally speaking, the settlement seems much the same for both phases but there is one significant difference. Coxcatlan's extensive layers, possibly representing macrobands, seem to result from occupations of longer duration. The rubbish includes remains not only of spring plants but also of fall foods. Thus, I would speculate that during Coxcatlan times a series of microbands came together at certain spots during the spring to eat ripening wild plant foods and, further, to plant their gardens. The harvest from their gardens, together with their minimal food surplus probably allowed them to stay in the same

place from spring to fall. Autumn acorn picking was probably accomplished on short excursions. Only during the dry winter season, it would seem, were these people forced to become wandering microbands; even then it would have probably been for a relatively short, but hungry, period. After that, it seems likely that they returned to the spring camp to live with other returning bands. During this phase it is probable that as the number of domesticated plants and the volume of agricultural produce increased, the time during which the people remained together as macrobands lengthened progressively.

HYPOTHETICAL STAGE III

CULTURAL COMPLEXES

Coxcatlan

Abejas

COMMUNITY PATTERN

Semi - sedentary Macrobands that had wet - season - fall camps (○○) or annual camps (●●) but who often seperated into dry season microband camps (·).

POPULATION ESTIMATE

10 times the *original population*.

ESTIMATED AGE

5000 to 3000 B. C.

SUBSISTENCE Plant collectors who did increasing amounts of agriculture due to new domesticates (first chile and squash then corn then beans and gourds).

OCCUPATIONS FOUND

ca. 20

Fig. 12. A tentative reconstruction of the settlement pattern of the Coxcatlan and Abejas complexes.

Cultural activities of the Coxcatlan people were similar to those of El Riego. Techniques of flint knapping were identical but the resultant types differed. While some varieties of Gary, Ensor, Flacco, Abasolo and Tortugas points continued to be used, the majority of the points found were new types called Garyito, Coxcatlan, Tilapa, Desmuke, and Almagre (or San Nicholas). Blades, side-scrapers, and choppers were the same, but scraper planes and choppers were usually smaller and discoidal in outline, gouges were more prevalent, and coup de poing-like choppers were common.

Although the total number of ground stone tools decreased, the number of types increased. Some manos, mullers, and mortars were still used. Definitely basin-shaped metates occurred for the first time as did well-formed manos and stone bowls.

One piece of worked leather was uncovered. From the refuse we took wooden tools such as trap fragments, atlatl foreshafts, awls, and

digging tools. We discovered a larger amount of string, representing a greater number of varieties; all nets found were knotted. Coiled basketry was represented by fragments, most of which were made with an interlocking stitch over a bundle foundation; a few were sewn with interlocking stitches, others, with split stitches. A number of bone awls and a needle also occurred. One fragment of cloth may possibly be from a twined blanket.

One bundle burial, without its head, lay in a pit in Purron Cave. It was in a zone that we have tentatively assigned to the Coxcatlan phase. If this assignment is correct then it is very possible that the burial ceremonialism of the El Riego horizon continued into Coxcatlan times.

The next archaeological complex, Abejas, is less well-understood than those previously. This is due in part to the small number of artifacts representing the complex and in part to our failure to recognize it until late in the field season when I had little time to work on analysis. The horizon is tentatively placed between 3400 and 2500 B.C. on the basis of the three radiocarbon dates so far determined.

In one zone (D) at San Marcos Cave there was a large quantity of preserved foodstuffs; this is the basis for the reconstruction of the subsistence pattern of the Abejas phase. The zone referred to probably belongs to the early part of the phase. Wild plant food was still predominant in the diet, but agricultural produce was a close second; evidence of hunting and trapping was scanty. The domesticated plants include amaranth, mixta and moschata squash, gourds, and corn. No beans were noted, but I suspect that they were used because they seemed to be present in the earlier Coxcatlan phase. The predominant agricultural plant was maize and most of the cobs seemed to be of a primitive race--pre-Chapalote, Bat Cave, or a race much like pre-Chapalote. The tassels were still attached to the end of a number of these cobs; all seemed to be a pod-pop variety.

Because the survey discovered no open sites it is almost impossible to reconstruct the settlement pattern. The occupation layers in caves of the Abejas complex would lead one to believe that the community patterning was much the same as that of the Coxcatlan phase. However, I keep having the nagging feeling that more adequate survey will reveal that villages began during this time period.

Flint knapping was still a major industry with about the same unifacial types as in the Coxcatlan horizon, except that small, flake endscrapers appear for the first time. Bifaces were less numerous, but there were bifacial knives, choppers, and Garyito, Almagre (San Nicholas variety), Shumla, Flacco, and Ensor points. Prismatic blades struck from conical polyhedral cores with or without prepared striking platforms were prevalent and long, neatly-made obsidian blades occurred for the first time. These were probably struck from cylindrical polyhedral cores.

Our sample is very inadequate. On the basis of this sample it ap-

pears that the ground and pecked stone tools were very different from those of the previous horizon. Metates were oblong in outline with well-defined rims but without feet. Manos were oval or cylindrical. Stone bowls were well-made, thin and relatively large. They occurred in three forms--tecomates, hemispherical bowls, and flat bottomed bowls with outflaring rims.

Perishable artifacts were not numerous and consisted of knotted maguey fibers which may have been snares, string, a piece of atlatl foreshaft, whittled pointed sticks, sticks that might have been part of traps, and a very fragile piece of a coiled basket with a bundle foundation; impressions on the coils indicate it might have been made with split stitches.

Burials have not been found.

The Purron complex--our most poorly known assemblage--follows the Abejas complex. I estimate that it existed between 2500 and 1900 B.C. There were hints that agricultural produce was dominant over wild plant food. Settlement pattern is unknown. Though we lack stone bowls and projectile point types, the other stone tools were duplicates of those in the Abejas complex. Even these were not very numerous. The most numerous artifacts were potsherds. These were thick (between 1 and 2 cm.), tempered with large (1 - 5 mm.) grit or gravel, fired at low temperatures, friable and with poorly smoothed surfaces. If someone says the Purron complex is nothing but a ceramic complex, I am afraid I cannot disagree.

The next complex, called Coatepec, is also based on its distinctive ceramics. I have debated with myself whether this should be included as an early part of the next phase, Ajalpan, or whether it should be considered a separate entity. At present I am separating it, but further analysis might do away with it. Please, bear with me. Though it is only known from two components, one of them yielded a large sample of artifacts.

On the basis of one radiocarbon date I am tentatively placing the Coatepec complex between 1900 and 1500 B.C. Small amounts of foodstuffs from Purron Cave hint that subsistence was predominately based on agriculture. A few of the corncobs display characteristics that are interpreted as representing teocenti introgression. Evidence concerning settlement pattern is poor, but fragments of wattle-and-daub hint that the people probably lived in small villages.

Chipped stone tools consisted of blades, end-of-blade scrapers, side-scrapers, flake end-scrapers, small plano-convex end-scrapers, bifaces and a number of types of projectile point. Predominant were Garyito, of perhaps a couple of varieties, with Gary (San Nicholas), Ensor, Shumla and Catan, also present.

Ground and pecked stone tools were numerous. Metates were oblong, with ridged edges, but lacked feet. Other forms included oval stone plates, stone bowls, cylindrical or ovoid manos, mortars, cylin-

drical pestles, and pendants.

The pottery was distinctive, with grit temper, a well-knit paste, and with smooth or brushed surfaces. Surfaces were not slipped. A few sherds exhibited fugitive red paint, and a few sherds showed brushing that might represent decoration. Vessels were mainly tecomates but there were a few hemispherical bowls, bowls with flat bottoms and outflaring rims, and globular ollas with outflaring rims.

Figurines seemed to be absent, but a fragment of what may possibly be a figurine occurred at Ajalpan in an area of poorly-defined Zone H. Perishable artifacts and burials have not been found.

The Ajalpan phase that overlies the Coatepec ceramics is represented by large samples of artifacts and sherds. Radiocarbon dates place it between 1500 and 1000 B.C. Food remains indicated that these people grew corn, beans, squashes, gourds, amaranth and chile.

Excavations at Ajalpan indicated that at least some people lived in small villages composed of wattle and daub houses. No evidence of ceremonial structures or pyramids of this period has been found.

HYPOTHETICAL STAGE IV

CULTURAL COMPLEXES

Abejas?

Purron?

Coatepec

COMMUNITY PATTERN

Semi-permanent villages (▒▒) composed of a number of microbands living together that occassionally made camps for hunting or planting (○○) or collecting (· ·).

POPULATION ESTIMATE

40 times the *original population*.

ESTIMATED AGE

3000 to 1500 B. C.

SUBSISTENCE

Full time agriculturists who planted an increasing amount of domesticates. Plant hybridization may have begun.

OCCUPATIONS FOUND

ca. 10

Fig. 13. A tentative reconstruction of the settlement pattern of the Coatepec complex, and possibly of the Abejas and Purron complexes.

Chipped and ground stone artifacts were about the same as those of the Coatepec complex. They were, however, much less numerous.

The paste of the majority of the pottery was still much the same. Tecomates were the dominant vessel form in this utilitarian ware but the other three minor forms occurred. However, even with this ware there were differences in that the tecomates definitely were decorated by zoned brushing, had punctations on their necks, had a red wash over

their whole bodies and a few had a band of specular hematite on their rims. At least three other wares also appeared. One was of fine paste, usually thin, had a specular hematite exterior with a single band on the inner rim. The form of vessel characteristic of this ware is a bowl with a flat bottom and straight outflaring rim. The second ware was fired black in a reducing atmosphere; exterior sometimes was polished. The inner surfaces of a few sherds representing the bottoms of flat bottomed bowls exhibit interior incising (molcajete-like). The third type, made of a fine paste was a plain ware like the utilitarian ware. Crimson streaks decorated a few sherds and a few sherds, from what seems to be late Ajalpan, carry zoned dentate stamping, either rockered or straight. The latter sherds were very similar to those from El Trapiche I on the Vera Cruz coast.

Figurines were of two or three types. One type was relatively small with gingerbread cookie-like crude bodies and poorly made heads with punctated facial features. The second type was large and solid with realistically modeled facial features. While the first group showed a fair degree of uniformity, the second did not. Late in the period large hollow figurines appeared that were not dissimilar to some from Morelos and some associated "Olmec" materials. It is my general impression that the early figurines might be lares or penates or household gods while the later ones represent deities of some more widespread cult or religion.

The one flexed burial in a large bell-shaped pit with an associated Morelos-like figurine was further confirmation of the above hypothesis, as similar discoveries were made at Tlatilco in the Valley of Mexico.

The next horizon called Santa Maria was extremely well-represented. Unfortunately the great bulk of material came out of the ground late in the season; because of my lack of knowledge of it I will describe the phase in very general terms. Radiocarbon dates suggest that it existed between 1000 and 300 B.C. Abundant foodstuffs revealed these people to have been full-time agriculturists with corn, beans, squash, gourd, pumpkin, chile, amaranth, tomato and perhaps some other domesticated plants. Although we have not studied the data carefully, there is good information concerning the settlement pattern of the Santa Maria people. Although occasional camps occurred in caves the predominate occupation was in small villages of wattle and daub houses. Some of these villages had pyramids. It may be that a number of villages were oriented around ceremonial centers.

Though chipped stone tools occurred they were not numerous. Palmillas, Gary, Shumla and Morhiss points predominated. Blades and end-of-blade scrapers occurred, as did small plano-convex end-scrapers, bifacial knives, and choppers. Legged rectangular metates, manos, mortars, small celts or adzes, pendants, and cylindrical pestles were ground out of stone.

Perishable remains include sandals; bark cloth; string; knotted nets;

HYPOTHETICAL STAGE V

CULTURAL COMPLEXES

Ajalpan
St.Maria

COMMUNITY PATTERN

Ceremonial centers or villages with temples (▩) with ceremonially affliated villages (▒) and seasonal camps (⁘).

POPULATION ESTIMATE

150 times the *original population*.

ESTIMATED AGE

1500 to 200 B. C.

SUBSISTENCE

Full time agriculturists using many hybrid domesticates. Irrigation may begin.

OCCUPATIONS FOUND

ca. 40

Fig. 14. A tentative reconstruction of the settlement pattern of the Ajalpan and Santa Maria complexes.

split-stitched, coiled, and twilled baskets; cotton or other fiber blankets made on a simple belt loom; and many other items.

The most numerous items of this cultural phase were potsherds. There were white, black, brown, red, gray and white-rim black wares. The later two wares appeared to be dominant in the final part of this period. The degree of continuity from earlier Ajalpan ceramics has not been determined. There were decorated sherds of red-on-white, white-on-red, and red-on-black, and sherds with incised lines filled with red paint. Also, there were incised grater bowl decorations as well as incised lines on thickened rims. Many of the white wares with parallel interrupted lines on the rims are identical to those in Chiapa de Corzo II. There were a wide variety of vessel forms; bottles, composite silhouette vessels, hemispherical bowls with thickened rims, plates, and other forms occurred for the first time, as did handles and feet for vessels.

Figurines were numerous and though they are like types from the Valley of Mexico they appeared to have been locally made. Heads like Valley of Mexico types C1 and C3 occurred early in the phase, D and Olmec types occurred in the middle of the phase while Ticoman types and local types appeared near the end of the phase. Figurines were quite standardized and may have represented deities of widespread cults or a pantheon of gods of a definite religious institution.

Both burials found were extended and placed in slab-lined graves; one was accompanied by fabrics. It may well be that these are burials of common people and that more ornately furnished burials of the upper classes are yet to be found.

Developing out of the Santa Maria phase is Palo Blanco. Comparative data from Monte Alban indicate that it occurred between 300 B.C. and A.D. 700. Foodstuffs and feces revealed that the people were full-time agriculturists with corn, moschata and mixta squash, gourds, beans of a number of races, pumpkins (c. pepo), amaranth, manihot (dulcis?), chile, tomato and zapote. A preliminary study of the feces revealed the interesting fact that the diet of these people was more well-balanced than that of the vegetal eaters of previous horizons. Remains of meat, wild plants and agricultural plants occurred in most feces. The greater increase in agricultural produce was directly correlated with the use of irrigation. Aqueducts, irrigation ditches, dams and terraces occurred for the first time in this period.

HYPOTHETICAL STAGE VI

CULTURAL COMPLEXES

Palo Blanco

COMMUNITY PATTERN

Sacred Cities and or ceremonial centers with villages (ceremonially and politically) affiliated and camps.

POPULATION ESTIMATE

1000 times the *original population*.

ESTIMATED AGE

200 B. C. to 700 A. D.

SUBSISTENCE

Full time agriculturists with irrigation.

OCCUPATIONS FOUND

ca. 150

Fig. 15. The settlement pattern of the Palo Blanco complex.

With the increase in agriculture and irrigation there seemed to have been a corresponding increase in population. Almost all the hilltops in the Tehuacan Valley were covered with ceremonial centers with pyramids around a plaza, ball courts, terraces and house platforms. They are, in a way, imitations of Monte Alban. A few of these ruins were big enough to be considered large towns or small cities. In fact, I usually refer to them as "sacred cities". Smaller villages with or without a pyramid occurred sometimes on hilltops but a few were in valley bottoms. Camps also occurred in caves and in the open. Though we have not analyzed the data it would appear that we had a series of hamlets, or peasant villages, oriented around urban-like ceremonial centers, possibly with full-time specialists and nobility.

Chippers of flint produced Tula, Teotihuacan, Tehuacan, Morhiss, Ensor and Palmillas points, blades and cylindrical polyhedral cores, flake end scrapers, end-of-blade scrapers, side-scrapers and bifacial knives. Ground stone tools consisted of legged metates, manos, adzes, celts, mortars, pestles and bark beaters. Perishable remains included string of many varieties, twined nets, woven cloth, bark cloth, mats or petates, coiled baskets, twilled baskets, sandals and many other tools.

The pottery has not been analyzed, but from my cursory glance at it I judge that most of the sherds were like the gray wares of Monte Alban III. A lesser proportion were thin orange wares. The few figurines we have found are mold made.

A number of burials of this period were uncovered in cave excavations. Most of these were in pits, flexed and accompanied by vessels and food remains. During the survey, Peterson found the stone outlines of Monte Alban-like tombs. These have not been dug.

The final phase is Venta Salada. Comparative data suggest it existed from A.D. 700 to 1500. Agricultural practices, with irrigation, were about like those of the previous period.

Sites of this period were widespread through the valley and a number of kinds of assemblages occur. There were camps in many caves and in the open. Many villages and mounds were connected with the salt industry. Many villages lacked recognizable ceremonial features. Habitation occurred near irrigation features. Some villages or towns had many pyramids and ceremonial features. Most striking were the

HYPOTHETICAL STAGE VII

CULTURAL COMPLEXES

Venta Salada

COMMUNITY PATTERN

Secular Cities or towns ( ) with (religously, politically and economically) affiliated ceremonial centers ( ), villages ( ) and camps ( ).

POPULATION ESTIMATE

5000 times the *original population*.

ESTIMATED AGE

700 to 1500 A.D.

SUBSISTENCE

Full time agriculturists with irrigation as well as commerce.

OCCUPATIONS FOUND

ca. 200

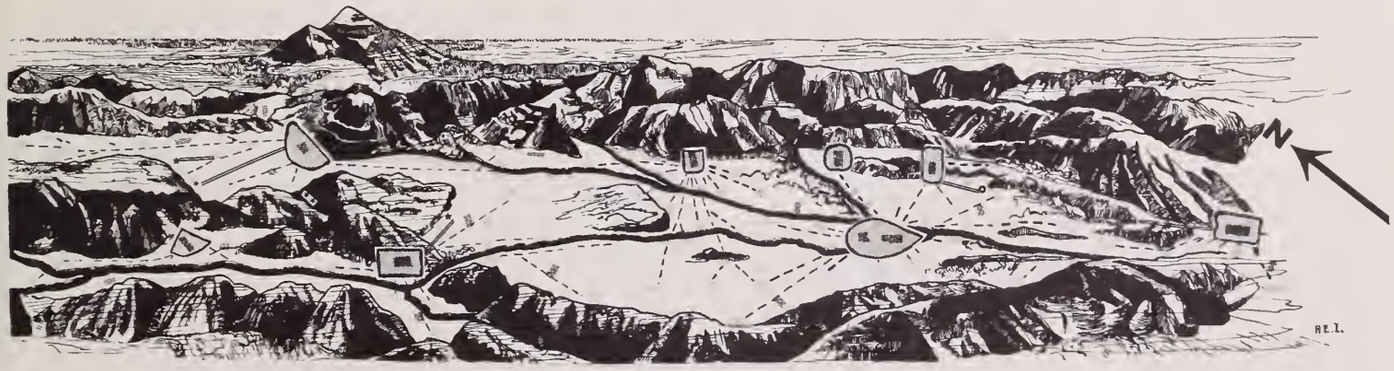


Fig. 16. The settlement pattern of the Venta Salada complex.

huge ruins with many pyramids, house structures, plazas, ball courts, and defensive walls. They were usually at the valley flanks but a couple occurred in the center of the valley. These I have called secular cities. Early documents on the Tehuacan Valley hint that these "secular cities" were political capitals and trade centers and only secondarily religious or ceremonial centers. Attached to each center with its "king" would have been a number of other groups of communities.

Chipped stone artifacts--relatively rare in the previous two phases --increased in number. Particularly noticeable were a while series of small arrow points--Matamoras, Storr, Catan, Tula, Teotihuacan, Harrell, and San Marcos types. Tehuacan and Morhiss large types also occurred. Obsidian blades and cylindrical cores were very numerous. Flake end-scrapers, thumbnail end-scrapers, end-of-blade scrapers, side-scrapers, bifacial knives and choppers continued to be used. Ground stone objects were not numerous and included celts, mortars and pestles, bark beaters, manos, and legged metates.

Pottery was characterized by Cholula polychrome, orange wares, local polychromes, a gray ware, and a plain ware. Decoration was by incising, engraving, stamping and painting. Characteristic vessel forms included bowls with outflaring rims with slab or effigy tripod feet, bottles, ollas with vertical necks, or with outflaring rims, plates and incense burners. In addition, clay beads, spindle whorls, ladles, pipes (?), and mold-made figurines were manufactures of the times.

Burials were flexed and placed in pits accompanied by grave goods; however, outlines of tombs have been recorded.

Further analysis of this horizon supplemented by a study of codices and early documents should eventually give a rather full picture of the way of life of the Venta Salada people.

As is perhaps obvious from this brief summary of the Tehuacan cultural sequence there are still many unsolved problems. In terms of field work, more survey information is needed about sites of the Coxcatlan, Abejas, Purron, Coatepec, and Ajalpan phases. Excavation of more components of Ajuereado, Abejas and Purron is necessary--particularly at open sites. Perhaps we can solve the problem of how the earliest village began and developed. A study of the Formative periods should be made with an eye to correlations of regional sequences. More radiocarbon dates are very necessary. The biggest task is, however, analysis of what we have uncovered. Botanical studies of our corn must be completed before we can determine if we have definitely solved the problem of the origin of corn domestication. Further studies of our stone bowls may decide whether these led to the first pottery. In fact, on every front and from every direction much analysis is needed. Once this has been done, there remains the job of writing up all our researches and, of course, publishing our conclusions. I do not believe we will suffer from boredom for want of things to do in the future seasons.

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